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Peeling the Onion:  
The Iraqi Center of Gravity in Desert Storm

A Monograph  
by

Major Collin A. Agee  
Military Intelligence

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Fort Leavenworth, Kansas

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## ABSTRACT

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by MAJ Collin A. Agee, USA, 60 pages.

This monograph examines the concept "center of gravity" as applied by coalition forces during Operation Desert Storm. Center of gravity is an integral part of operational art and figures prominently in current U.S. doctrine.

It begins by tracing the concept's inception in Clausewitz's On War, finding several competing definitions in various sections of that landmark work. Current U.S. doctrine reveals that time has done little to alleviate the confusion. The U.S. Army definition of center of gravity as a strength is significantly and irreconcilably different from the Marine Corps' treatment as a weakness. The Air Force offers yet another slant.

Given those inconsistent definitions, it is little wonder that various participants and analysts suggest differing centers of gravity during Desert Storm. From various sources, the monograph compiles a list of a dozen contenders for the title "Iraqi Center of Gravity." It next examines coalition planning and actual combat action in search of a *de facto* center of gravity, concluding that the Republican Guard was the true Iraqi center.

The monograph then suggests The Onion Model as a unifying representation of the concept. Adding the terms Protectors, Connectors and Sustainers to the Center of Gravity, it graphically portrays the relationship of the other eleven contenders to the true center of gravity.

The study concludes that the center of gravity remains a valuable, if misused, concept. In Desert Storm, this misapplication of doctrine was overcome by an abundance of combat power; the center was hit because everything was attacked. In the future, U.S. forces may not enjoy the same luxury of time and resources. A future doctrine based on overwhelming force must be tempered by the Law of War's requirements for military necessity, proportionality, and avoidance of unnecessary suffering. These principles, as well as military efficiency, will be well served by a concept of center of gravity used consistently by all services--made understandable by the Onion Model.

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## I. INTRODUCTION

Desert Storm drew rave reviews from a spell-bound American public, military experts world-wide, and even the U.S. press. Time Magazine coined the campaign, "the apotheosis of warmaking as a brilliant American craft: a dazzling, compacted product, like some new concentrate of invention--Fast! Improved! Effective!"<sup>1</sup> Army Times declared it impossible to find fault with the American-led attack or detect a single element of AirLand Battle that was neglected.<sup>2</sup> The war seemed the epitome of military efficiency.

Amidst the praise, however, could be heard criticism, including this scathing assessment written during the air campaign:

It is a party--a drunken one turning sadistic. Relentless aerial bombardment--lately about as surgical as operating on a cornea with machetes--is a systematic destroying of Iraq's electricity, water, and sewage facilities. That, plus blowing up bridges and obliterating neighborhoods, is called "softening up the enemy."<sup>3</sup>

Other editorials equated massive air strikes to terrorism inflicted on an innocent populace to turn them against their leader.<sup>4</sup> An officer from the Air University, obviously impressed by the air campaign, impugned the Army's doctrine and performance, contending the ground war was merely a "sucker punch" thrown at an already defeated enemy.<sup>5</sup>

If the detractors are right, the indiscriminate application of force against militarily insignificant targets implies that the coalition did not focus their efforts--they failed to identify a center of gravity--or hit it only because they hit everything.

Clausewitz explained why we should scrutinize campaigns such as Desert Storm: experience is more valuable than abstract truths; history provides the test of theory.<sup>6</sup> He also explained his self-

proclaimed role as a *kritik* (critical analyst): to recognize the truth, rather than to judge.<sup>7</sup> Therefore, without intent to tarnish the luster of the campaign, this study examines an aspect of our doctrine--and its application.

Success is dangerous because it breeds complacency. In November 1991, General Powell signed Joint Pub 1, Joint Warfare of the US Armed Forces. In describing the fundamentals of joint warfare and guidelines for the conduct of campaigns, the manual repeatedly cites Desert Storm as the "school solution." In particular, it validates the center of gravity as a key component of US doctrine, asserting that,

The concept of centers of gravity established a clear focus for operations and intelligence requirements. At both the strategic and operational levels, enemy centers of gravity were identified, analyzed, and confirmed and served as the basis for devising both the national military and theater strategies.<sup>8</sup>

It was not that simple. In fact, the muddled use of the term during Desert Storm makes the swift success all the more amazing. The confusion is not surprising, given the foggy elucidation in Clausewitz's On War. Nearly two centuries and several wars later, "center of gravity" continues to defy concise definition. Although US joint doctrine increasingly emphasizes the importance of identifying the center of gravity, each service has its own definition. The descriptions in Army and Marine Corps doctrine are diametrically opposite of one another. The Air Force adds yet another slant.

Within Army doctrine, there are omissions and contradictions; other elements of operational design are not well integrated into the doctrine. In an extreme example, decisive points, a Jominian concept, are confused with centers of gravity in the Army's key-

stone warfighting manual.

Despite this lack of consensus or definition, the Iraqi threat in the fall of 1990 suggests several potential centers of gravity. Similarly, coalition actions provide insight into target priorities and the campaign planners' perception of the threat. The fruit of this analysis (or in this case, the vegetable) is the Onion Model, which graphically depicts the relationship of components of military power to the center of gravity. Hopefully, Desert Storm can spur refinement of theory and emerging operational doctrine.

I come not to bury the center of gravity, though I place it in an onion. I find fault with the contemporary interpretation and application of Clausewitz, but enduring value in the theory, if applied correctly. Clausewitz intended his ideas to be enduring. He wrote, "It was my ambition to write a book that would not be forgotten after two or three years, and that might be picked up more than once by those who are interested in the subject."<sup>9</sup> I doubt he would object to refinement of the unfinished On War.

More notable Clausewitz adherents have found flaws. General Huba Wass de Czege, largely responsible for introducing operational art in Clausewitzian terms to Army doctrine, commented in a 1988 article that On War needed editing; it was difficult to distinguish absolute models from real empirical phenomenon.<sup>10</sup> Michael Howard, in his introduction to On War, noted that Clausewitz feared his admirers more than his critics, because his disciples would misinterpret incomplete ideas and erroneously apply them to contemporary circumstances.<sup>11</sup> The US military is guilty of that error, but the concept--center of gravity--merits salvation.

## II. CLAUSEWITZ'S CENTER OF GRAVITY

The idea of a military center of gravity originated in Clausewitz's On War. Book VI, Chapter 27's definition appears simple and understandable:

The center of gravity is always found where the mass is concentrated most densely. It presents the most effective target for a blow; furthermore, the heaviest blow is that struck by the center of gravity. . . . The fighting forces of each belligerent . . . have a certain unity and therefore some cohesion. Where there is cohesion, the analogy of the center of gravity can be applied. Thus, these forces will possess certain centers of gravity, which by their movement and direction, govern the rest, and those centers of gravity will be found wherever the forces are most concentrated.<sup>12</sup>

With that definition in hand, identification of a center of gravity seems a mechanical task: simply locate the greatest mass, the greatest concentration of forces. He further prescribed:

One must keep the dominant characteristics of both belligerents in mind. Out of these characteristics a certain center of gravity develops, the hub of all power and movement, on which everything depends. That is the point against which all energies should be directed.<sup>13</sup>

He elaborated that all efforts must focus on destruction of enemy forces. He disdained the "easy way," imploring that an enemy cannot be truly defeated unless his center is sought. In contrast to contemporary approaches to warfare, he contended, "We are not interested in generals who win victories without bloodshed."<sup>14</sup>

Clausewitz considered fighting the essence of war; in fact, he considered battle the true center of gravity of war (this introduces the confusion created by multiple definitions of the term).<sup>15</sup> He defined major battle as the collision between centers of gravity and criticized the lesser use of force toward objectives that did not lead to victory.<sup>16</sup>

Clausewitz borrowed "center of gravity" from physical science along with friction, polarity, inertia and mass. The term is derived from the German word *schwerpunkt*: *schwer* meaning heavy and *punkt* meaning point or spot.<sup>17</sup> Napoleon's campaigns greatly influenced Clausewitz's theories. Witness Napoleon's assertion that, "There are in Europe many good generals, but they see too many things at once. I see only one thing, namely the enemy's main body. I try to crush it, confident that secondary matters will settle themselves."<sup>18</sup>

Clausewitz did not clearly specify single or multiple centers of gravity. At one point, he declared, "The ultimate substance of enemy strength must be traced back to the fewest possible sources, and ideally to one alone." He further prescribed, "The first task, then, in planning for war is to identify the enemy's centers of gravity, and if possible trace them back to a single one."<sup>19</sup> At the strategic level, he identified five centers of gravity:

- \* the opposing nation's army
- \* the capital
- \* the army of a nation's protector
- \* a key ally
- \* public opinion<sup>20</sup>

In planning a campaign, Clausewitz emphasized accurate identification of the enemy center of gravity. If numerical superiority is not enjoyed, the skill of the commander results in relative superiority at the decisive point. The result is destruction of the enemy's armed forces.<sup>21</sup>

In various locations in On War, Clausewitz referred to the

center of gravity as a blow, a concentration of force, cohesion and a battle.<sup>22</sup> It is not even clear whether he considered the center of gravity a physical entity, a state of morale, or an activity. James J. Schneider and Lawrence L. Izzo, in their aptly titled, Clausewitz's Elusive Center of Gravity, contend that Clausewitz went too far by suggesting personalities and public opinion as centers of gravity.<sup>23</sup>

Recalling that On War was a set of incomplete notes at the time of his death, we can conjecture that he would have resolved these competing definitions and ambiguities. But the document published after his death remains the best summary of Clausewitz's theories, with all its imperfections. Even his most ardent admirers, such as Michael Howard, concede, "It is not easy . . . to give a fair and comprehensive summary of Clausewitz's strategic doctrine, since it is presented with infuriating incoherence."<sup>24</sup>

Jomini's decisive points complement centers of gravity, sharing the emphasis on identifying the most important aspect or element of the hostile force.<sup>25</sup> Jomini identified several variants of the decisive point in The Art of War (Appendix A). The descriptions reflect Jomini's emphasis on terrain, versus Clausewitz's focus on forces. Several recent monographs explored the relationship of decisive points to the center of gravity. One coined the decisive point the "gateway" to the center of gravity.<sup>26</sup> Another summarized, "The seizure or retention of an objective point places the holder in a position of advantage relative to the enemy's center of gravity."<sup>27</sup> It offered the following hierarchy of decisive points:

- \* strategic points: have military significance

- \* decisive points: a subset of strategic points; those which have a marked influence on a campaign
- \* objective points: those decisive points against which the commander commits forces<sup>28</sup>

As we examine current doctrine and Desert Storm, it becomes evident that the relationship between centers of gravity and decisive points is not universally understood. In fact, they are often confused with one another.

### III. DOCTRINE

The center of gravity holds a central position in current US doctrine. Perhaps the best example is the recently published Joint Publication 1: Joint Warfare of the US Armed Forces, which contains General Colin Powell's guidelines for joint warfare. It also serves as an after-action report, from the perspective of the Chairman, for Desert Storm; the Gulf operation is frequently cited to illustrate characteristics of joint warfighting.

In straightforward terms, the pamphlet states, "The joint campaign is oriented on the enemy's strategic and operational centers of gravity" and "direct attack of the enemy's strategic centers of gravity . . . is closely linked to the joint theater campaign."<sup>29</sup> Joint Pub 1 also cites center of gravity as the concept that integrates intelligence and operations.<sup>30</sup>

The Marines fight in accordance with Fleet Marine Force Manual 1: Warfighting. The Marine definition of center of gravity tends toward Clausewitz's treatment of cohesion, rather than the destruction of forces. FMFM 1 prescribes that "the object of maneuver is not so much to destroy physically as it is to shatter the enemy's cohesion, organization, command, and psychological balance."<sup>31</sup> Di-

verging from the Clausewitzian definition, the manual erroneously equates centers of gravity with enemy weaknesses. This is not to say that attacking vulnerabilities is ill-advised; however, this manual further blurs an already fuzzy definition. A footnote leaves no doubt as to the USMC interpretation of center of gravity:

Applying the term [center of gravity] to modern warfare, we must make it clear that by the enemy's center of gravity we do not mean a source of strength, but rather a critical vulnerability.<sup>32</sup>

FMFM 1 states that maneuver warfare relies on speed and surprise to overwhelm the enemy and destroy his cohesion. To "shape the battle," the emphasis is not on identifying sources of strength, but on isolating critical enemy vulnerabilities.<sup>33</sup> Perhaps it is predictable that the doctrine of a numerically small service would be oriented not on achieving even local superiority, but in exploiting weaknesses.

The manual describes enemy "surfaces and gaps." Surfaces are strengths; gaps are weaknesses which can be exploited. If none exist, they must be created. It further explains that gaps may be physical (such as an undefended point along a defensive line) or a function of time and space, such as a unit caught in open terrain.<sup>34</sup> Surfaces and gaps will be incorporated into the "onion" model.

The Marines' companion manual, FMFM 1-1, Campaigning, discusses "critical enemy factors." To plan a campaign, it prescribes identifying and destroying that which is critical to enemy success--something he cannot do without, creating vulnerability through successive actions.<sup>35</sup> Curiously, it does not use the term "center of gravity," in contrast to Warfighting, which was published a year

earlier in 1989. The manuals are consistent in calling for attack on vulnerabilities, rather than strengths.

The US Air Force's keystone manual is AFM 1-1, Basic Doctrine of the USAF. Like the Marine Corps' Warfighting, it does not explicitly use the term center of gravity, perhaps because AFM 1-1 was published in 1984, just as the center of gravity was emerging in journals and doctrinal literature. Nevertheless, the thrust of the concept is present, with a predictable slant toward the dominance of air power. It states,

The capacity for an enemy to wage war depends on the strength of his forces and the will of the people to use those strengths. An enemy's will and capabilities are the fundamental elements of his warfighting potential. An air commander has the capability to attack this potential in depth through strategic and tactical aerospace actions.<sup>36</sup>

Clausewitzian theory identified several categories of centers of gravity. Air Force doctrine emphasizes the will of the people and the fighting forces, calling for exploitation of the psychological impact of air operations. Michael Howard, in Clausewitz, observed that between the World Wars, as the argument raged over the role of the air arm, proponents of air power argued that the center of gravity was no longer a nation's armed force, but the morale of its civilians. The obvious conclusion was the air force should become the dominant component, since it alone could directly attack the population.<sup>37</sup> This approach is evident in contemporary Air Force doctrine.

A more complete understanding of Air Force doctrine can be gained from Colonel John A. Warden III's 1988 book, The Air Campaign, Planning for Combat. Not only is Warden an authority on Air

Force doctrine, he was instrumental in Desert Storm air campaign planning. The tenets in his book were unmistakable in the campaign.

Warden's perception of the center of gravity, focused on vulnerability, is remarkably similar to the USMC doctrinal approach. . .and remarkably different from the Army's. His center of gravity is the point where the enemy is most vulnerable and where an attack will be most decisive. In a passage that portends Desert Storm, he contends that if there is more than one center of gravity, force must be applied to all of them. He suggests the planner should focus on "reachable centers of gravity" if resources do not facilitate direct attack on the ultimate center.<sup>38</sup> His analysis coincides with General Powell's analogy of peeling an onion when Warden warns, "the real center of gravity may not be reachable initially."<sup>39</sup>

Warden describes several types of conflict, including "Case II," which can theoretically be won from the air alone via decisive strikes against centers of gravity. He emphasizes centers of gravity selection, offering several possibilities: equipment, logistics, geography (including facilities), personnel, and command and control (C2). He advises evaluation of the "equipment chain" to identify the vulnerable link in bringing combat systems from raw materials to components to complete systems, and their delivery to the battlefield.<sup>40</sup> The utility of striking early in the chain presupposes protracted conflict, if breaking the chain is to have a material effect on the battlefield.

Warden presages Desert Storm by labelling C2 (he includes com-

munications and intelligence) an "obvious center of gravity." He summarizes, "command is a true center of gravity worthy of attack in any circumstance in which it can be reached."<sup>41</sup>

At the strategic level, Warden suggests air power offers the unique capability to strike directly at the political center of gravity. He asserts that, "no government can function long when the enemy operates freely above it. . ."<sup>42</sup> If the intention of the Desert Storm air campaign and the considerable effort against Baghdad was to remove Saddam Hussein from power, it was unsuccessful.

To summarize Warden's treatment of the center of gravity: every enemy has a center of gravity and air superiority allows access to it. In certain circumstances, direct strikes against the center of gravity may result in victory without ground forces.

Army doctrine's center of gravity bears little resemblance to USAF and USMC doctrine. Operational art, and the center of gravity, entered the Army's formal lexicon with the publication of the 1982 FM 100-5, Operations and was expanded in the 1986 version. Self-described as the Army's "keystone warfighting manual," FM 100-5 is the basis for subordinate doctrine, professional education, and training. It promises,

. . . a stable body of operational and tactical principles rooted in actual military experience and capable of providing a long term foundation for the development of more transitory tactics, techniques, and procedures.<sup>43</sup>

FM 100-5 hones in on identification of the center of gravity as the essence of operational art, which it defines in Clausewitzian terms as a source of strength and balance. It advocates concentration of superior combat power against that point as the key

to decisive success.<sup>44</sup>

Appendix B of the manual, "Key Concepts of Operational Design," devotes its first section to the center of gravity. The definition is straight out of Clausewitz: "that capability, characteristic, or locality from which an armed force derives its freedom of action, physical strength, or will to fight." This definition embraces all categories suggested by Clausewitz; the definition remains ill-defined. It further explains that an operational center of gravity may be abstract, such as cohesion among allies or the psychological state of a key commander. A strategic center of gravity may similarly be intangible; the manual cites popular and political support, using Verdun, Dien Bien Phu and the Tet Offensive as examples.<sup>45</sup>

The center of gravity also permeates FM 100-5's discussion of campaign planning. It states that an effective campaign plan orients on centers of gravity.<sup>46</sup> Offensive campaign planning identifies forces, physical features, or a combination of the two, as potential centers of gravity.<sup>47</sup> The list for a defensive scenario is expanded, encompassing fighting units, command or support facilities, politically significant areas, or allied units.<sup>48</sup>

Unlike the sister services, Army doctrine considers centers of gravity sources of strength, not weaknesses or vulnerabilities. This does not mean the Army does not exploit vulnerabilities--concentration of combat power against enemy vulnerability is one of the AirLand Battle Imperatives.<sup>49</sup> An isolated section of Appendix B seems at odds with the otherwise consistent Army treatment of centers of gravity as sources of strength. It cites a unit bound-

ary as a center of gravity.<sup>50</sup> This source of confusion could be alleviated by incorporating Jomini's concept of decisive points into a section which already includes lines of operations.

If FM 100-5 is the "center of gravity" for Army doctrine, three additional publications bear mention. FM 100-7, The Army in Theater Operations, was revised in draft form in December 1991. It restates FM 100-5's emphasis on centers of gravity, but elaborates on the key elements of operational art: centers of gravity, decisive points, culminating points, lines of operations and the relationship of ends, ways and means. In the process, it avoids some of the imprecision of FM 100-5. It promises a definition of center of gravity in the glossary; alas, it has no glossary!<sup>51</sup>

The role (or absence) of centers of gravity in Army intelligence doctrine warrants scrutiny. If the intelligence operating system helps the commander come to grips with his enemy, enemy center of gravity should be a key element of analysis. FM 34-130, Intelligence Preparation of the Battlefield, supports that notion by calling for determination of the enemy center of gravity in the Threat Integration Phase.<sup>52</sup> Alarmingly, FM 34-3, Intelligence Analysis is devoid of mention of the center of gravity.

Contemporary theorists have not hesitated to shoot holes in the theories of Clausewitz or current doctrine. Their criticisms are based either on inherent flaws in original theory, or on revisions necessitated by the changing nature of warfare.

B.H. Liddel Hart attacked the "dogma of Clausewitz" which demanded blood as the price for victory. His preferred method--the indirect approach--directly contradicted Clausewitz's call for cli-

mactic, decisive battle between main forces.<sup>53</sup> Liddel Hart blamed that strategy for the slaughter of World War I. Liddel Hart's call for overwhelming force, resulting in decision without battle, lives in Joint Pub 1.<sup>54</sup>

Another critic is the School of Advanced Military Studies' James J. Schneider. In his Theory of Operational Art, he contends that campaigns are no longer decided by decisive battles, armies no longer mass, the only decisive battle is the last one of the campaign.<sup>55</sup> Does Desert Storm prove him wrong? He argues that Clausewitz's center of gravity analogy has been stretched too far. In physics, power is a function of mass. While the same may have once been true for military force, it is less so today. Schneider explains that the combat mass of a contemporary force is determined by the fire density of the deployed force, including close air support and artillery.<sup>56</sup> If the force no longer needs to mass spatially, and incurs risk in doing so, identification of a Clausewitzian center of gravity becomes difficult.

Yet Schneider does not discard the center of gravity. He considers selection of correct physical objectives a precondition to effective military action, and cites identification of the enemy center of gravity as the first step in the design of a campaign plan. Schneider includes three categories of decisive point in his theory of operational art: physical (such as the road to Basra), cybernetic (C2), and moral (will).<sup>57</sup>

Schneider and Izzo's Clausewitz's Elusive Center of Gravity takes dead aim at the ambiguity of FM 100-5. It implores, "The definition of center of gravity there presented cries for refine-

ment. . . . Soldiers are going to have to start using the term correctly and with uniform understanding."<sup>58</sup> The essay also contrasts Clausewitz's emphasis on mass with Jomini's emphasis on decisive points. In a solo article, Izzo contends that the American concept of center of gravity fails to differentiate between strengths, weaknesses and vulnerabilities.<sup>59</sup>

This section has shown the definition of center of gravity to be anything but clear. From the inconsistencies in Clausewitz's original, unfinished work, the concept has become muddled with Jominiian terms, is not applied clearly in Army doctrine, and is inconsistent when compared to the Air Force and Marine Corps. The only area of consensus seems to be that the concept is critical to planning a campaign! With that shaky foundation, the planners of Desert Storm analyzed the Iraqi threat.

#### IV. THE IRAQI CENTER(S) OF GRAVITY

An examination of Desert Storm planning logically begins with the Iraqi threat, to determine what components comprised Iraqi power. Not unlike the actual campaign planners, we'll consider a list of potential centers of gravity.

In the fall of 1990, Iraqi power and military capabilities suddenly became a concern for military planners, the media, and even a public which previously paid little interest to the country. One source of information was an unclassified War College study which examined the Iran/Iraq War and projected the future of Iraqi power and implications for the US. Conclusions from that report--an excellent starting point in a search for centers of gravity--are summarized in Appendix B. The study offered no clear key to the

defeat of Iraq. Indeed, Iran had failed despite what seemed to be clear military superiority over a protracted conflict. The following list, partially gleaned from the War College study, suggests a dozen potential centers of gravity.

1. SADDAM HUSSEIN. Since taking power in 1979, Hussein masterfully consolidated power, ruthlessly disposing of potential opposition. He bombed Kurdish villages to quell revolts and formed secret police to ensure his survival. Early in the Iran/Iraq war, a Revolutionary Command Council meeting entertained the prospect of Iran settling the war if Hussein would step down. Hussein asked all in favor of his resignation to go outside, shot them and returned to the meeting.<sup>60</sup> Upon accepting a 1988 cease fire with Iran, he turned his attention to Kurds in Iraq, killing more than 5,000 with poison gas.<sup>61</sup>

Clearly, here was a dictator with a iron grip on his nation. Despite generous treatment of his military, his generals were not uniformly supportive. After grinding through the Iran-Iraq War, he was thrusting them into confrontation with the United States and most of the world. If Hussein were eliminated, Iraqi resolve to pursue an aggressive foreign policy was questionable. So careful was Hussein to protect his position, it was unclear who would succeed him.

2. WILL. Hussein personally exhorted his military and populace to support aggressive action. Yet surely the soldiers and citizens of Iraq grew weary of the economic drain and human cost of the Iran war. Hussein publicly proclaimed he would sacrifice two million casualties to defeat the coalition.<sup>62</sup> Would his soldiers

and their families share his willingness to sacrifice?

3. ECONOMY. Iraq incurred tremendous debt to prosecute the war against Iran. Kuwaiti unwillingness to forgive debt played a part in the decision to attack Kuwait. The "War of the Cities" had damaged the infrastructure of urban areas.

In 1990, the Iraqi economy was further crippled by an embargo of its oil exports. As a single-product economy, it should have been the perfect target for economic sanctions, yet UN sanctions had little effect on Iraqi will, seeming only to steel them in defiance of the United States. Would military strikes cause an already strained economy to collapse, destroying the will of the people to hold Kuwait? Would it cripple the armed forces? Would it induce the Iraqis to rid themselves of Saddam Hussein?

4. POWER GRID. Perhaps a subset of the ECONOMY, destruction of the Iraqi power grid would bring the war to every Iraqi whose lights went out. It would shake the "business as usual" atmosphere in Baghdad and reduce the bravado of the Iraqi Sampson standing up to the American Goliath, at little personal cost. It would hamper Iraqi military operations by disrupting communications.

5. COMMAND AND CONTROL. Consistent with Hussein's autocratic leadership, Iraqi command was centralized. He could not delegate decision-making to subordinates, for fear that they would turn on him. This required extensive communications between forces in the field and Baghdad.

If this potential center of gravity seemed inviting, it was also well-protected. With foreign assistance, Iraq had constructed an extensive bunker complex. These bunkers were 80 feet deep with

walls six to nine feet thick, featured two foot steel-reinforced concrete between floors, and had a hard rubber foundation with springs to absorb shock.<sup>63</sup> This protection may have reflected Hussein's consideration of his own center of gravity.

6. SCUD MISSILES. Iraq first employed Scuds against Iran in March 1985. By February 1988, Scud B's were targeted against Tehran.<sup>64</sup> Iraq modified the Scud-B to accommodate more fuel by reducing the warhead from 2,200 to 500 pounds. Called the "Al-Hussein," it could range 400 miles, allowing it to strike Riyadh and Tel Aviv. The Iraqi inventory numbered some 400 (a total still unconfirmed) with the ability to carry chemical warheads. Another variant, coined the "Al-Abbas," had only a 250 pound warhead, but could travel 500 miles. The Scud's Achilles heel was its accuracy--only 1-2 miles.<sup>65</sup>

With these systems, Iraq could strike coalition forces directly with little warning, exploiting what Hussein perceived as a low threshold to sustain casualties. It could also strike civilian targets in Saudi Arabia and Israel, the latter in an attempt to provoke retaliation by Israel and disrupt the fragile coalition. Clausewitz would have approved.

7. ARTILLERY. As the War College study indicated, Iraqi doctrine emphasized massed, long-range fires, and the Iraqi inventory of 3,000 artillery pieces reflected that philosophy.<sup>66</sup> The terrain offered little cover to escape the barrage. Hussein's artillery also offered a means of delivering chemical rounds.

8. NUCLEAR, BIOLOGICAL AND CHEMICAL WARFARE (NBC). NBC was potentially the equalizer available to a desperate leader who his-

torically showed little concern for loss of life or hesitancy to use chemical weapons. Iraq's nuclear potential was a contentious topic. The US was aware of Iraq's acquisition of fissionable material and components for nuclear devices. The best estimate: fielding a weapon was a year away. So while there was no threat of immediate use, coalition planners scrutinized research and development facilities at five sites.<sup>67</sup> They also targeted three biological weapon research facilities.<sup>68</sup> They felt Iraq had the capability to unleash anthrax, botulism, cholera, equine encephalitis, tularemia, and typhoid.<sup>69</sup>

The most likely NBC weapon to be used was chemical. Iraq first used chemical agents against Iran in 1983 to counter Iranian human wave attacks; Iran reported 45,000 chemical casualties. In 1987 and 1988, Iraq dropped mustard gas and the nerve agent Tabun on Kurdish villages, killing 5,000 in the town of Halabjah. Iraq possessed 2,000 to 4,000 tons of chemical agents.<sup>70</sup>

At the end of the Gulf war, Iraq formally admitted to 280 tons of mustard gas, 75 tons of Sarin, 500 tons of Tabun, 1,481 chemical artillery shells and bombs, and 30 chemical Scud warheads. They did not disclose how much was destroyed during the war.<sup>71</sup> There was evidence that Hussein had delegated chemical use to Corps commanders, yet none was employed.<sup>72</sup> Why? Competing theories range from the inability of Iraqi troops to protect themselves to fear of nuclear retaliation. It may be that Iraqi planners simply did not foresee the type of results against coalition mechanized forces that they enjoyed against Iranian dismounted infantry.

#### 9. REPUBLICAN GUARD. The Republican Guard originally served

as Hussein's personal bodyguard, then evolved into his elite military force. A Guard brigade was badly damaged in combat against Iran in October 1980. In 1982, the RG grew to three brigades, and in 1986 participated in the failed attack against the Al Faw Peninsula. Despite the setback, the Guard enlarged to five brigades: three armored, one mechanized, and one commando. By 1988, the RG had swelled to 28-34 separate brigades, most tank heavy, with better pay, food and equipment than their regular army counterparts. Their ranks were filled by colleges students (the closing of all universities in 1987 provided a convenient source of manpower). As an indication of their protected status, Iraqi doctrine called for withdrawal of RG units after 30% casualties, versus 50% for the regular army.<sup>73</sup> In the last two years of the Iran-Iraq war, the RG (30-33 brigades in eight divisions) served as a strategic reserve for counterattack. In the Kuwaiti Theater of Operations (KTO), the RG numbered 110,000 in eight divisions. The balance of the force comprised 435,000 in 36 divisions.<sup>74</sup>

A strong case can be made for the RG as a center of gravity. As Iraq's mobile forces, they were the only units who could hope to match coalition mechanized and armored units. Their traditional role as protectors of Saddam Hussein attached a psychological importance to their survival. Their positioning behind regular army forces in Kuwait made it difficult for less reliable forces to contemplate desertion. Finally, the RG blocked the path to Baghdad.

10. IRAQI AIR FORCE. The Iraqi Air Force was the most professional and best trained component of the Iraqi military. The sixth largest air force in the world, it boasted 950 aircraft (655

combat) dispersed at 54 bases. Its inventory included 90 Mirage F-1s, 20 MiG-29 Fulcrums and the offensive punch of Tu-22 Blinder and Tu-16 Badger bombers. Other aircraft included MiG-25 Foxbats, Su-24 Fencers, 85 armed helicopters and two Il-76 Mainstays--the Soviet equivalent of the U.S. AWACS.<sup>75</sup>

This impressive force demonstrated the ability to conduct deep strikes against Iran. Not only would these forces pose a threat to coalition forces and economic targets inside Saudi Arabia, they could severely complicate coalition ground operations.

11. AIR DEFENSE. The survival of the Iraqi Air Force, indeed many of the aforementioned categories, depended on keeping coalition air forces at bay. Air superiority was not within Iraqi capabilities, yet Iraq needed to protect vital assets. Like the rest of the military, the air defense network was highly centralized and dependent on communications. Designed after the Soviet model, it was a mixture of missiles and guns, with the need to acquire targets by radar.

12. LOGISTICS. Extended lines of supply offered targets that would deprive forces in the KTO of food, water, fuel and ammunition.

There are cogent arguments for all 12 categories as critical elements of the Iraqi occupation of Kuwait. The challenge facing coalition planners was not to find a center of gravity, but to isolate one or more from among the contenders. This was an opportunity for doctrine to shape planning. A substantive model of the center of gravity, augmented by appropriate adjuncts such as decisive points, should have focused the analysis and provided a framework

for coalition planning. Was the campaign focused on a single or limited set of targets?

#### V. COALITION ACTIONS

The cliche states that, "actions speak louder than words." The planning activities and pre-combat statements of commanders and planners of both air and ground campaigns offer insight into the impact of the center of gravity concept on Desert Storm campaign design. Further evidence comes from the well-documented actions of coalition forces after the shooting started.

Where better to start a search for the center of gravity than with the campaign commander? General Schwarzkopf provided a straightforward explanation of the center of gravity:

. . . that thing that if you destroy it, you destroy his ability to wage war. The centers of gravity were Saddam Hussein himself because of the highly centralized leadership. I don't mean personally destroyed. I mean the ability to function. Number two, the Republican Guard. And number three, his chemical, biological and nuclear capability. It doesn't take a genius to figure out that if those things are gone, his ability to wage war is to all intents and purposes finished.<sup>76</sup>

If only it were that simple. The coalition attacked numerous targets beyond those three.

The campaign plan briefed to General Powell on October 10, 1990 was a four phase operation (Appendix E). That evolution of the plan contained the three centers of gravity cited by General Schwarzkopf. . .but several other target categories as well--with no apparent hierarchy of importance.

In The Commanders, Bob Woodward identified target categories presented to Secretary of Defense Dick Cheney for approval in November and December 1990. Attached as Appendix C, the list in-

cludes all twelve potential centers of gravity, except will. Considering the non-tangible nature of will, it was affected at least indirectly; the list was all-inclusive!

COL (Ret) Trevor N. Dupuy wrote an insightful book prior to the war (published ten days into the air campaign) called How to Defeat Saddam Hussein. Dupuy proposed five alternative courses of action and tagged them with catchy names (summarized in Appendix D). Despite his accurate prediction of coalition actions, he failed to identify a center of gravity.

PLANNING THE AIR CAMPAIGN. The Air Campaign was the responsibility of LTG Chuck Horner, the Joint Forces Air Component Commander, or JFACC. An initial concept for the air campaign was formulated at the Pentagon by an Air Staff working group under the direction of COL Warden. The working group briefed GEN Schwarzkopf and LTG Horner the second week of August, 1990 and received the CINC's approval on the 14th.<sup>77</sup> As recounted by Horner, the objectives which guided planning were:

- \* Destroy/neutralize air defense command and control.
- \* Destroy NBC storage and production capability.
- \* Render ineffective national and military command, control, and communications facilities.
- \* Destroy key electrical grids and oil storage facilities.
- \* Deny military resupply capability.
- \* Eliminate long-term offensive capability.
- \* Disrupt and weaken the Republican Guard forces.<sup>78</sup>

This list totals half of the suggested categories. My original list did not include "long-term offensive capability," but this wild-card category could well include the Air Force, Scuds and Hus-

sein, in addition to the RG, which made the list. The inclusion of military potential gives pause for thought. Clausewitz prescribed destruction of an enemy to defeat him, not to stifle future aggression. Yet Clausewitz's declaration of political primacy over the military makes such an objective understandable.

It is surprising that Horner did not explicitly include the Iraqi Air Force, given doctrinal requirements for air supremacy. In fact, it is difficult to imagine a plan influenced by COL Warden without the enemy air force atop the list. CNN analyst James Blackwell, in his post-mortem, cited the Iraqi Air Force as a "vital center of gravity."<sup>79</sup>

In Saudi Arabia, Horner formed a USAF planning cell in Riyadh known as the "Strike Cell" (or "Black Hole" for their secretive planning facility) headed by BG Buster C. Glosson. The cell generated targeting priorities consistent with the Pentagon list--with the inclusion of the Iraqi Air Force.<sup>80</sup>

The air campaign commenced the evening of 16/17 January, as the first wave of attackers struck air defenses and C3 centers. The first night saw 1,000 sorties and 2,500 tons of ordnance.<sup>81</sup>

President Bush provided yet another list of centers of gravity in his address to the American public on the eve of the air war: "We are determined to knock out Saddam Hussein's nuclear bomb potential. We will also destroy his chemical weapons facilities. Much of Saddam's artillery and tanks will be destroyed."<sup>82</sup> Perhaps the President was making a twelfth hour attempt to weaken Hussein's will to fight by warning of the decimation of his military power. Alternatively, his aim may have been to bolster American resolve by

emphasizing Iraqi offensive capabilities.

Early strikes against aircraft on the ground, air bases and runways proved that the Iraqi Air Force was on the target list. Other notable early targets included Hussein's Baath Party Headquarters, the Defense Ministry, key C2 nodes, and Saddam's hometown of Tikrit.<sup>83</sup> The latter was of questionable military value; perhaps Bush was sending Hussein a personal message--an attack on his will to fight?

By the 20th, the sortie count was at 7,000. Eventually, "Instant Thunder" shifted to attack air defenses in the KTO and finally to softening up ground forces. On the 26th, the first Iraqi aircraft fled to Iran. By the 30th, 30,000 sorties had been flown. By mid-February, the total had doubled; nearly 3,000 flew daily, with 100-200 aimed at the RG and an equal number hunting Scuds.<sup>84</sup>

During the "Mother of All Briefings" at war's end, Schwarzkopf explained a color-coded map which portrayed Iraqi strength in theater: green for less than 50% strength, yellow for 50-75%, red for greater than 75%.<sup>85</sup> This stoplight scheme visually cued him to the level of attrition he wanted before attacking with ground forces. In total, some 110,000 sorties destroyed 1,300 tanks, 800 armored personnel carriers and 1,700 artillery pieces, roughly half the total in theater.<sup>86</sup>

The final phase of the air campaign shifted to Iraqi ground forces, aimed at inflicting casualties and inducing surrender. Psychological warfare leaflets were dropped on Iraqi troops. B-52's dropped intimidating 750 pound bombs and MC-130's unleashed 15,000 pound "daisy cutter" bombs which created shock waves that

collapsed bunkers. Fuel/air explosives, "the poor man's nuke," created casualties, detonated minefields and created severe over-pressure and shock waves. Napalm ignited oil pools and trenches.<sup>87</sup> Of the dozen candidates for centers of gravity, Saddam Hussein was arguably the only one untouched.

PLANNING THE GROUND CAMPAIGN. CENTCOM also got outside help planning the ground campaign, in the form of graduates from the School for Advanced Military Studies. As the CENTCOM staff focused on Desert Shield, a small team headed by LTC Joe Purvis began developing the concept that would become Desert Storm.

The mission they received on 18 September 1990 was straightforward: plan the ground offensive. They posted a list of "Parameters" on the wall of their small cell; atop the list was: "Outnumbered!" As Purvis recalls, they began by comparing strengths of the opposing forces. For the coalition, they tallied air forces, attack helicopters and command and control. For the Iraqis, they listed an extensive air defense system, experience in defensive combat, and the Republican Guard as a strategic reserve. They considered the RG key to the defense of Kuwait--a center of gravity.

In LTC Purvis' words,

We attempted to identify the center of gravity. This proved difficult due to the normal discussions [that occur in SAMS]. Also, the CENTCOM staff became more focused on what it [the center of gravity] was as opposed to what do we do with it. Therefore, we did not use the term, except in the [planning cell]. In any case, at the strategic level, we decided that Saddam was the key, but that we could do nothing about him legally and ethically. We could and did isolate him and cause the battle to be fought without centralized command.

The Republican Guard was the focus at the operational level. If we could mass our ground forces on the RG without fighting any other force, we had perfect

success. Also, if the RG left the theater, surrendered, or were defeated, we still had, to our opinion, dealt appropriately with the "C.G."<sup>88</sup>

LTC Purvis elaborated that selection of a center of gravity simplified planning. "Having the RG accepted as the focus allowed us to argue with a rationale vice emotional or parochial points of discussion."<sup>89</sup>

Specific actions against the RG will be addressed in the topical discussion that follows. Suffice it to say that the RG was promptly routed and the Iraqis lost 4,550 tanks, 2,880 armored fighting vehicles and 3,257 artillery pieces.<sup>90</sup> The demise of the RG was quickly followed by an end to the war.

The contrast between Air Force and Army planning is sharp. The Air Force attacked virtually the entire array of available targets. In Clausewitzian fashion, they destroyed a significant fraction of Iraqi power. Yet Hussein remained intransigent throughout the air campaign. Ground planners isolated two centers of gravity (at two levels of war) and determined that only one was acceptable. Although the ground offensive racked up equally impressive numbers of destroyed systems, ground planners were willing to avoid a fight with enemy forces--including the center of gravity itself. This focus ended the war in 100 hours.

Does this resolve the question of the Desert Storm center of gravity? Does RG = CG? Hardly. The only boldfaced words in the preface to Joint Pub 1 emphasize, "Joint warfare is essential to victory."<sup>91</sup> If the coalition effort is examined *in toto*, all 12 categories received considerable attention.

1. SADDAM HUSSEIN. There were political, ethical and moral

problems with attacking Hussein directly. Despite these considerations, in September 1990 Air Force Chief of Staff General Michael Dugan warned, "We know where he is, and where his mistress is, and where his family is, and we can get them."<sup>92</sup> Whether Dugan's comments reflected actual planning or were intended merely to intimidate Hussein, they contributed to Dugan's firing by Secretary Cheney.

It was difficult to track Hussein's movement. He frequently moved from bunker to bunker and had a modified mobile home for a command post. The coalition attacked the presidential mansion the first night of the air campaign, along with several command bunkers as the campaign progressed.

Arguably, the center of gravity was not Hussein personally, but his ability to command. The coalition publicly broadcast the location of Iraqi C3 centers to discourage Hussein from occupying them.<sup>93</sup> An intelligence officer offered, "He didn't dare go to a major command facility. We reduced him to running the war out of the back of a jeep in a Baghdad residential neighborhood."<sup>94</sup> Attacks on the power grid and communications facilities effectively degraded his link with the KTO.

2. WILL. Another way to cripple Hussein was to erode domestic support by exposing his inability to protect his citizenry. The ensuing discussion of economic targets demonstrates the extent to which this was accomplished, yet Iraqi will, at least in Baghdad, showed few signs of weakness. The controversial strike on a command center (or civilian shelter, depending on whose version was believed) seemed to tangibly alter the mood in Baghdad. Mixed with

outrage directed at the United States was a realization that Hussein could not protect even Baath Party officials and families in the capital.

The will of the Regular Army forces in Kuwait proved fragile, a fact exploited by the coalition. Psychological warfare included radio and loudspeaker broadcasts and 14 million air-dropped leaflets urging surrender.<sup>95</sup> In response, the Iraqis formed execution squads to deal with deserters. And desert they did--over 65,000 in all.<sup>96</sup> Four American helicopters accepted the surrender of 421 Iraqis; camera crews recorded attempts to surrender to journalists. A US report characterized the mood of an Iraqi soldier: ". . .on a scale of one to ten, morale is a negative twenty."<sup>97</sup>

3. ECONOMY. The air campaign included strikes against the electrical power grid, oil industry, petrochemical plants (such as missile fuel and chemical weapons plants), agrochemical plants (capable of producing nerve and biological agents), fertilizer plants (that could make explosives), missile industry, civilian telephone system and water facilities. This list reflects close links with military capabilities, but the attacks strained an economy already stressed by economic sanctions. Despite Iraq's dependence on outside sources for many products, her resilience in the face of sanctions and willingness to endure hardship makes this an unlikely center of gravity.

4. POWER GRID. The televised drama of the first attacks on Baghdad--explosions and fires at the generating plant and the resulting loss of power--serve testament to the coalition's ability to impair the power supply. The result was felt both by

the Iraqi populace and military. Unfortunately, the latter had back-up systems which mitigated the impact on military operations. Except in the literal sense, this was not the hub of all power.

5. COMMAND AND CONTROL. At the strategic level, we've seen how the coalition sought to degrade the link between Hussein and his forces. Lower levels were affected as well; communications between corps and divisions was sporadic.<sup>98</sup> The importance of these links were lessened by Iraq's defensive posture. Front line forces could have executed set-piece defenses with little or no guidance from higher headquarters or adjustments to plans.

6. SCUDS. On the first night of the air war, Iraq fired three Scuds at Israel and another at Saudi Arabia. Though some credit Scuds with winning the Iran-Iraq war, their 1-2 mile accuracy limited military utility. Yet their ability to strike at Saudi soil, coalition rear areas and Israel made them politically important. Iraq attempted to entice Israel to retaliate, hoping to create disarray among Arabs coalition partners. Two nights later, a Scud blast in Tel Aviv injured 17. By war's end, Scuds would kill one Israeli and injure another 239. For the US, the most costly Scud struck the 14th Quartermaster Company barracks at Al Khobar, Saudi Arabia, killing 28 and wounding 80. In total, Iraq fired 86 Scuds.<sup>99</sup>

In response, the coalition "went Scud hunting" with about 100-150 sorties a day, or about 10% of all sorties.<sup>100</sup> Scuds proved the most problematic of all targets. CNN assessed that the coalition expended three times as many sorties against Scuds as was originally planned.<sup>101</sup> The Third US Army Intelligence Officer la-

beled it a major distractor to air campaign objectives.<sup>102</sup> Another analyst declared, "The great Scud hunt was a miserable, and telling, disaster."<sup>103</sup>

The frustration of the Scud hunt can be explained by examining the Scuds' relation to the center of gravity. Scud launchers were not massed; to the contrary, they were deployed individually and moved frequently. While important politically, they had little military value. Elimination of all Scuds would not have resulted in Iraqi abandonment of Kuwait. Thus, coalition planners chafed at the expenditure of resources versus a target not related to the center of gravity.

7. ARTILLERY. Conventional artillery was not a center of gravity, but received considerable attention because it protected ground forces, particularly the RG. In General Schwarzkopf's words, "We destroyed their artillery; we went after their artillery big-time."<sup>104</sup> CENTCOM wanted 50% of Iraqi tanks and artillery destroyed in the KTO prior to launching the ground phase.<sup>105</sup> Their final tally indicated 1,485 out of 3,110 tubes (or 48%) destroyed.

8. NBC. Despite CENTCOM's inclusion of NBC weapons as a center of gravity, they were not significant. They were used in the Iran-Iraq war against dismounted forces; Iraqi planners likely envisioned lesser effects against mechanized coalition forces.

It may be argued that NBC was a center of gravity that was successfully neutralized by attacks against Scuds, artillery and chemical production facilities. Schwarzkopf suggested Hussein was deterred by the prospect of nuclear retaliation.<sup>106</sup> Iraqi troops were woefully ill-equipped to operate in a chemical environment;

many had no protective gear. Hussein may have simply calculated that his own vulnerability to chemical attack, plus the prospect of retaliation, made "the poor man's nuke" too expensive.

9. REPUBLICAN GUARDS. Included as one of the three CENTCOM defined centers of gravity, the RG was the true center of gravity. The RG spearheaded the capture of Kuwait and was the only force capable of countering a coalition attack. This elite force was psychologically critical to Iraq's will to fight. Defeat of their acknowledged first string would leave little hope for success. They were historically linked to the personal protection of Saddam Hussein, and now blocked the path to Baghdad.

The coalition campaign plan sought to interdict the RG's logistics, sever its C2 links with Baghdad, envelop it via the "Hail Mary," and destroy its forces in the KTO. General Yeosock, Third Army commander, declared, "The [RG] was the Iraqi center of gravity--its actions gave the best indicators of Iraqi intentions. Its defeat would achieve coalition objectives."<sup>107</sup> The VII Corps commander's intent specified envelopment and destruction of the RG as his main effort.<sup>108</sup>

Ultimately, the RG's defeat signalled the end of the war. Schwarzkopf summarized during an interview with David Frost:

I reported the situation to General Powell and he and I discussed, have we accomplished our military objectives? The campaign objectives? And the answer was yes. . . . We had destroyed the Republican Guards as a militarily effective force.<sup>109</sup>

10. AIR FORCE. A case could be made that the Iraqi Air Force was a center of gravity, that the coalition rightfully attacked and neutralized this target first. This reasoning would conclude that

victory was merely a matter of time once air superiority was won. Indeed, Schwarzkopf proclaimed, "The day we launched the air attack I said, 'We got 'em, we took their air away."<sup>110</sup>

Coalition efforts focused on several aspects of Iraqi air power, as called for by Warden. Early anti-runway attacks were abandoned due to losses of British Tornados. When Iraq refused to do battle in the air, the coalition attacked aircraft in their shelters. Iraq responded by dispersing aircraft in residential areas and even archaeological sites. Approximately 150 aircraft sought sanctuary in Iran.<sup>111</sup> While these survival techniques were successful to varying degrees, the Iraqi Air Force ceased to be a viable fighting force.

One week into the air campaign, General Powell announced the coalition had achieved air superiority. At the time, five out of 56 Iraqi airfields remained operational.<sup>112</sup> Yet air superiority failed to remove Iraqi forces from Kuwait. The true center of gravity, the RG, remained entrenched in the KTO. Air superiority stripped a layer of protection away from the center of gravity, leaving it vulnerable to ground operations. Not only could coalition forces pound the RG, their forces could move undetected, setting up the RG's envelopment. General Scwharzkopf summarized, "I could move the forces without [Hussein] being able to see them and, more importantly, even if he saw them, he couldn't do anything about it because we were going to control the air."<sup>113</sup>

11. AIR DEFENSES. The Iraqi air defense system was the first target in the air campaign. LTG Horner listed it as one of six critical accomplishments of the campaign.<sup>114</sup> Just as the Air Force

provided a layer of protection for ground forces, air defenses protected virtually all targets from aerial attack, particularly the Air Force and key C2 facilities. Not a center of gravity itself, this system had to be stripped away to expose the true center, the RG.

12. LOGISTICS. Midway through the air campaign, attacks shifted to materiel stockpiles, transportation assets and nodes, and lines of communications. General Powell explained, "Our strategy to go after this enemy is very, very simple. First we're going to cut it off, then we're going to kill it."<sup>115</sup> As the center of gravity, the RG was vulnerable because of its extended lifeline into the desolate Kuwaiti interior. Severe hardship undoubtedly contributed to the number of surrenders. During interrogation, an Iraqi senior officer recounted, "My division commander kept demanding that I provide supplies, and I told him that out of eighty trucks, I had only ten left. He told me to do it anyway."<sup>116</sup> There is little evidence that lack of ammunition, fuel or other supplies significantly altered Iraqi operations. The six-month stand-off of Desert Shield provided ample time to stockpile.

AND THE WINNER IS. . . Each of these twelve categories contributed to the Iraqi war effort. Each received attention from coalition planners and, ultimately, coalition ordnance. Various participants and observers offered conflicting assessments as to the true center(s) of gravity; there was no consensus. The CENTCOM campaign plan listed three centers, yet the CENTCOM CINC made contradictory statements. The war ended when the Republican Guards in Kuwait were defeated. The following section will suggest a model

that explains how the other 11 contenders contributed to the viability of the center of gravity, thus were legitimate targets.

#### VI. A PROPOSED MODEL: THE ONION

Finding and attacking enemy centers of gravity is a singularly important concept. Rather than attack peripheral enemy vulnerabilities, attacking centers of gravity means concentrating against capabilities whose destruction or overthrow will yield military success. Though providing an essential focus for all effort, attacking centers of gravity is not easy. "Peeling the onion," that is, progressively first defeating enemy measures taken to defend centers of gravity, may be required to expose those centers of gravity to attack.<sup>117</sup>

This notion from Joint Pub 1 inspired the model in Appendix F. The Onion Model contains:

- a. Center of Gravity--the heart of the onion
- b. Protectors--layers of skin which preserve the center
- c. Connectors--elements which link components of the onion
- c. Sustainers--the root system which sustains not only the center of gravity, but other categories as well

The relationship of the 12 elements of Iraqi power are reflected in the Appendix G. Many are self-explanatory; a few are not. Saddam Hussein and will to fight occupy space within the center of gravity. The model does not preclude multiple centers of gravity, but in this case Hussein was not attacked directly. Saddam's demise would not have automatically resulted in Iraq's withdrawal from Kuwait, given great uncertainty as to his successor. His survival did not indefinitely prolong the war. Will was critical to the RG, the Iraqi military as a whole, and indeed Iraqi society. Deterioration of will affected the actions of the RG.

A 1986 SAMS monograph suggested sub-centers of gravity, emanating like spokes from the hub--the true operational center. It

theorized that enemy reaction to attacks on a spoke would uncover the hub. The prescription, then, is to attack that sub-center which entails the least cost.<sup>118</sup> The Onion Model concedes the possibility of multiple centers of gravity. Since the underlying purpose of the model is to provide focus, the fewer the better. The monograph identified both strengths and weaknesses as sub-centers. In the Onion Model, these are Sustainers or Connectors.

Scuds and NBC occupy a segment of an "onion ring," but not a complete ring. Their use was optional, dependent on decisions of Hussein and Iraqi military leaders. Access to the center of gravity did not require penetration of these components.

Just as peeling an onion brings tears to the peeler's eyes, attacks on layers of the model entail costs. The most efficient campaign seeks the thinnest layers of protection. We previously considered the USMC notion of surfaces and gaps. FMFM 1 calls for exploitation of gaps; where none exist, they must be created. The coalition created gaps by nullifying the Iraqi Air Force and Air Defenses. Their artillery was degraded, and unable to provide adequate protection against a mobile foe. FMFM 1 explains that gaps may be physical, or in time and space. It illustrates the example of a unit caught in open terrain.<sup>119</sup> The coalition executed just such a tactic by forcing the RG from prepared positions.

The model addresses several criticisms of the current FM 100-5. COL James McDonough, director of SAMS and responsible for the evolving FM 100-5, suggests expansion of the discussion of operational concepts germane to operational art. He suggests addition of decisive points, among other concepts.<sup>120</sup> 1989 SAMS monograph

postulated a center of gravity surrounded by a shield composed of numerous decisive points. Defeat of the center of gravity is achieved by controlling decisive points and applying overwhelming force.<sup>121</sup> The Onion Model refines this notion with layering of protection. Decisive points could be identified on those layers. This depiction would also alleviate FM 100-5's confusion between decisive points and center of gravity.

The Onion Model supports AirLand Operations as envisaged in TRADOC Pamphlet 525-5, which calls for separating, isolating, and destroying enemy forces and capabilities prior to maneuver.<sup>122</sup> The model graphically portrays distinct categories of targets and their relationship to the center of gravity. It suggests elements such as Scuds and NBC which may be avoided while gaining access to the center of gravity. If an enemy possesses nuclear weapons, the attacker may wish to avoid threatening such a target to reduce their likelihood of employment.

The Onion Model borrows from Marine Corps doctrine while avoiding a misperception in that doctrine: the confusion of weaknesses with centers of gravity. Lawrence J. Izzo criticized that error in his aptly titled article, "The Center of Gravity is Not an Achilles Heel." He explained that destruction of one element of combat power may not be decisive, but can render the center of gravity vulnerable. His theory applies directly to Iraqi air forces and air defenses. His important conclusion: don't attack enemy vulnerabilities unless it contributes to destruction of the center of gravity.<sup>123</sup> The Onion Model delineates the relationship of components to the center of gravity. It depicts weaknesses as

holes or thin spots in layers of protection.

## VII. CONCLUSIONS AND IMPLICATIONS

Clausewitz's center of gravity was ill-defined. He offered numerous, contradictory definitions in On War. The concept's appeal to military strategists, as an instrument of focus which offers the most efficient employment of power, has ensured it's survival. Joint Pub 1, blueprint for American military action, embraces the concept.

Current doctrine is more confused than Clausewitz's own enigma. The Army calls the center of gravity a strength; the Marines call it a weakness. The only consensus is that the center of gravity is an important concept. Other operational concepts from Jomini and Clausewitz are inconsistently applied or ignored altogether.

Given this confused doctrinal foundation, is it any wonder that Desert Storm involved contradictory identification of center(s) of gravity by participants and observers alike? Fortunately, coalition forces enjoyed a wealth of sophisticated weaponry and well-trained forces that facilitated the attack on virtually every identifiable target category. It was also fortuitous that the true center of gravity, the Republican Guards, were not overlooked in the onslaught. When the RG fell, the war ended.

We may not enjoy an abundance of resources in future campaigns. Joint Pub 1 suggests the strategy of those campaigns: "we should strive to operate with overwhelming force . . . to achieve strategic advantage and exploit that advantage to win quickly, with as few casualties and as little damage as possible."<sup>124</sup> This philosophy is echoed in the January 1992 draft of National Military

Strategy for the 1990's, which calls for "Applying decisive force to overwhelm our adversaries and thereby terminate conflicts swiftly and with a minimum loss of life."<sup>125</sup> AirLand Operations concurs that military power must be decisive, that force should not be employed without the "potential for overwhelming military operations."<sup>126</sup>

We must be cautious in application of this strategy. The three general principles of the Law of War (military necessity, proportionality and unnecessary suffering), proscribe excessive application of military force.<sup>127</sup> Both the imperative to minimize friendly loss of life and the desire to avoid inflicting unnecessary destruction upon our adversaries depends on clear definition of the center of gravity. The focus provided by an identified center of gravity, coupled with an understanding of its Protectors, Connectors and Sustainers, serves this aim.

The West Point History Department has produced an insightful paper called The Battle of Convergence in Four Dimensions: BOC IV. BOC IV postulates the demise of the center of gravity, since massed units offer ripe targets to air and space based systems. Their concept of war in the 21st century emphasizes synchronization (time becomes a weapon) and space as the operational high ground.<sup>128</sup> The Onion Model envisions space as the ultimate Protector and Connector. If the Clausewitzian center of gravity, spatially massed, fades away, it will be replaced by a more evasive one, which the enemy will attempt to disperse in space and time.

The FM 100-5 in progress does not include an onion, but the unmistakable odor is present. It includes a section devoted to

"Concepts of Operational Design" which includes centers of gravity and decisive points. It clearly distinguishes one from the other and advocates focusing on vulnerabilities and weak points when the center of gravity is the enemy army. It warns of the complexity of the topic: centers of gravity not yet formed, multiple centers and those at different levels (tactical, operational and strategic).<sup>129</sup> Clausewitz take heart: your idea may yet endure!

The Onion Model suggests a unifying representation of an adversary and insight into the most efficient employment of military force. It is applicable to situations of superiority, to ensure military efficiency, and to situations of parity or inferiority, to ensure the best odds for victory. A strategy devoid of consideration of a center of gravity smells worse than an onion.

## APPENDIX A

### JOMINI'S DECISIVE POINTS

- \* geographic strategic points, such as centers of communications, military establishments and fortifications
- \* decisive geographic points, which facilitate control of main lines of communications
- \* strategic points of maneuver, which are based on their relationship to the forces and their potential actions
- \* decisive strategic points, which will have a marked influence on a campaign
- \* decisive points of maneuver, such as exposed flanks
- \* objective points of maneuver, such as fortresses, rivers and fronts, which provide favorable positions due to terrain
- \* geographic objective points, which (despite their name) are based on forces, rather than terrain<sup>130</sup>

APPENDIX B  
WAR COLLEGE STUDY

- \* The Iraqi Army was armor heavy (including T-72's) and relied on mass formations.
- \* The Iraqis employed massive long-range artillery, using the Soviet approach to fire support.
- \* They increasingly relied on attack helicopters.
- \* Iraq had a large, modern air force.
- \* They were capable of employing chemicals.
- \* The Iraqi Scud inventory was growing, including chemical-capable rounds.
- \* They conducted tenacious defenses and were well practiced at the tactical level, using intricate defensive systems.
- \* They tended toward set piece battles organized around kill zones.
- \* The Iraqis were skilled at strategic deception.
- \* The Iraqi leadership exploited Pan-Arabism as a motivational factor.
- \* Iraqi troops were among the best educated in the Middle East.
- \* Iraqi forces proved adaptable.<sup>131</sup>

APPENDIX C  
INITIAL TARGET LIST

According to Bob Woodward's The Commanders, the following target categories were briefed to Secretary Cheney:<sup>132</sup>

- \* Command, control and communications (C3) systems
- \* Air defense systems and radar
- \* Airfields
- \* 30 main Scud launch sites
- \* Nuclear reactor
- \* NBC production and storage facilities
- \* 8 Republican Guard divisions
- \* Supply network: depots, ammo dumps, transportation hubs, roads, bridges, railroads
- \* 12 major petrochemical facilities
- \* Electrical power system
- \* Other industrial targets which sustained the war effort
- \* Iraqi troops in Kuwait

## APPENDIX D

### HOW TO DEFEAT SADDAM HUSSEIN

- OPTION 1: COLORADO SPRINGS: Named in honor of the Air Force Academy; two phased air campaign which first attacked Iraqi war-making capabilities, then its ground forces. A prelude to ground attack.
- OPTION 2: BULLDOZER: Frontal assault; a battle of attrition.
- OPTION 3: LEAVENWORTH: Named for the Command and General Staff College; double envelopment of forces in Kuwait.
- OPTION 4: RAZZLE DAZZLE: A turning movement; deeper than option 3.
- OPTION 5: SEIZE: a preliminary phase of small scale probes, followed by options 1, 2 or 3.<sup>133</sup>

Dupuy's choice: Ten days of option 1, followed by ten days of option 5, followed by option 4.<sup>134</sup>

The actual campaign approximated options 1 and 4.

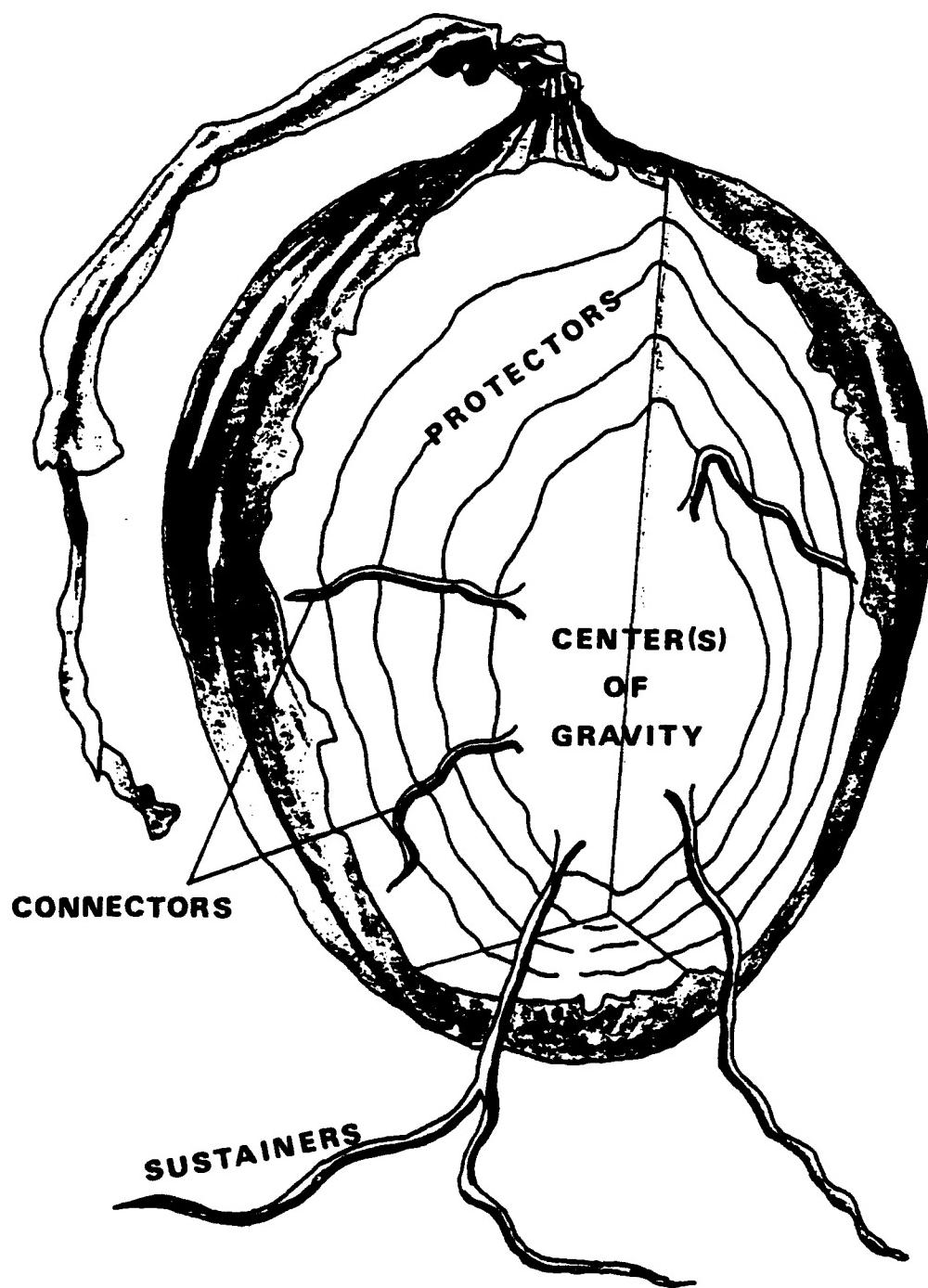
APPENDIX E  
CAMPAIGN PLAN, 10 OCTOBER 1990

As briefed to General Powell and Secretary Cheney by MG Robert B. Johnston, CENTCOM Chief of Staff.<sup>135</sup>

- PHASE 1: Air strike vs.: Command, control and communications (C3)  
Iraqi Air Force  
Air Defense System  
NBC capabilities
- PHASE 2: Air strike vs.: Supply bases  
Ammunition sites  
Transportation Facilities  
Roads
- PHASE 3: Air strike vs.: Ground forces  
Republican Guard
- PHASE 4: Ground assault

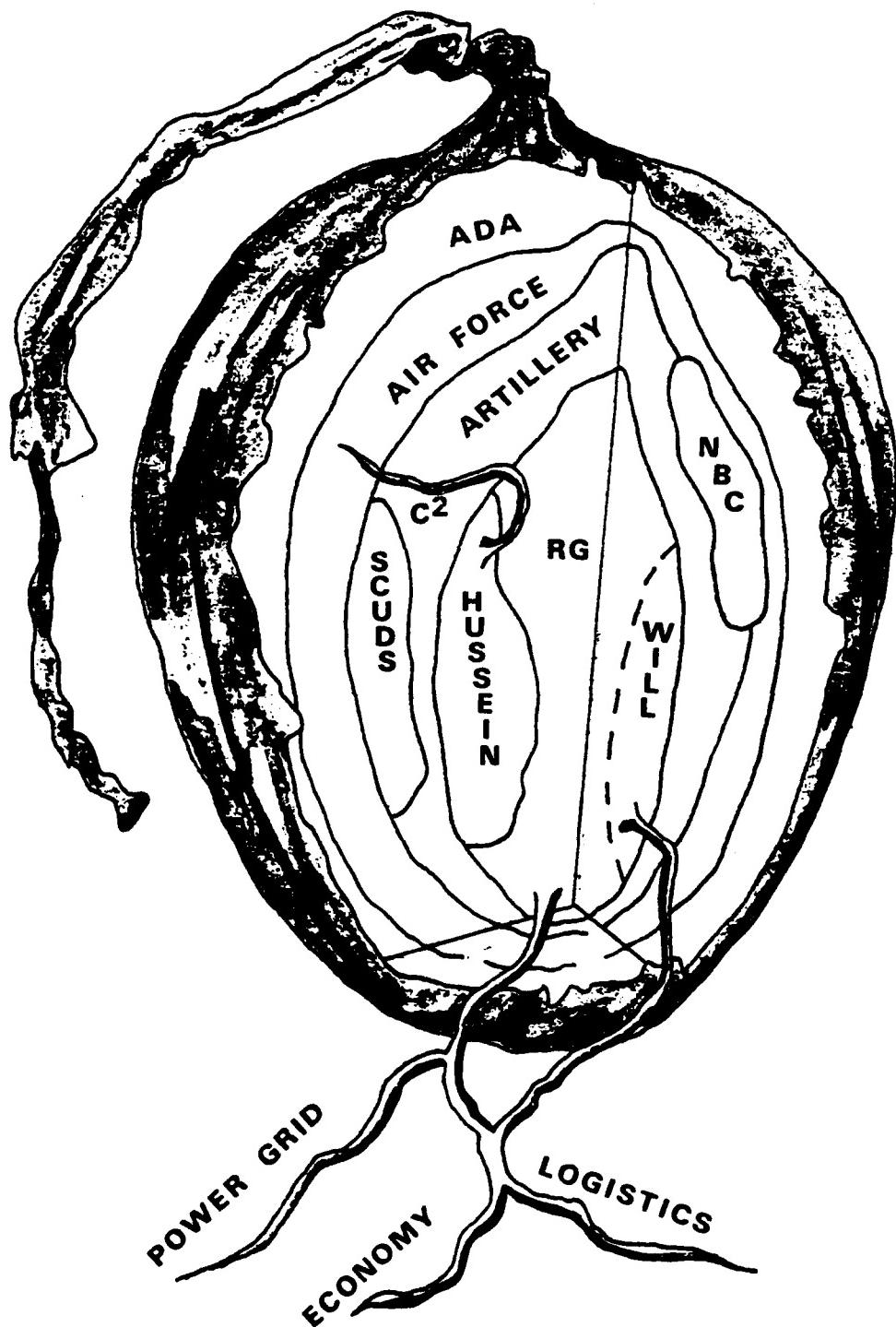
## APPENDIX F

# THE ONION MODEL<sup>136</sup>



APPENDIX G

THE IRAQI ONION<sup>137</sup>



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